

**Ph.D. IN CHEMISTRY
(PHDCHEM)**

00275

Term-End Examination

June, 2018

**RCH-003 : ANALYTICAL TECHNIQUES IN
CHEMISTRY – II**

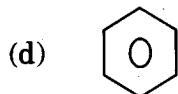
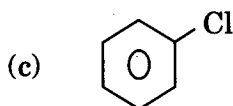
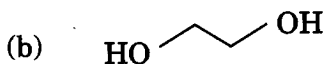
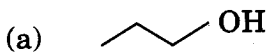
Time : 3 hours

Maximum Marks : 100

Note : Answer all the questions.

1. Differentiate between column efficiency and solvent efficiency. Illustrate them through examples. 10
2. What is gradient elution in HPLC and how is it different from the isocratic elution ? Which one of the two is advantageous and why ? 10
3. Write the full form of the acronym HETP and explain it. The chromatographic analysis of an analyte gives a peak with a retention time of 8.68 min. and baseline width of 0.29 min. Calculate the number of theoretical plates for it. 10

4. Explain the principle of RPHPLC. Arrange the following solutes in the increasing order of their elution in RPHPLC. Justify your answer. 10



5. Explain the expected pattern due to hyperfine coupling in tetrahedral clusters containing (i) four Co atoms, (ii) four Rh atoms, and (iii) two Co and two Rh atoms. Assume that in each case the unpaired electron density is uniformly distributed over the metal atoms. 10

6. Explain the following observation :

‘The ^{121}Sb Mössbauer spectrum of solid SbF_5 shows no resolved quadrupole splitting.’ 10

7. Describe the destructive and the constructive interference with respect to XRD. Explain Bragg’s equation for XRD. 10

8. How are the diffraction patterns analysed ? Explain with the help of an example. 10

9. What are the advantages and disadvantages of SEM? 10
10. Explain the principle of working of SEM with suitable illustrations. 10
-